

## Claims

- [c1] A method to monitor voltage and current signals using a multi-function generator protective relay system, said method comprising the steps of: measuring at least one of a voltage, a current and a phase angle; displaying at least one of a relay contact status and the power values on a display.
- [c2] A method in accordance with Claim 1 wherein said step of measuring comprises the step of connecting a plurality of relays having a combination of functions to a device.
- [c3] A method in accordance with Claim 1 wherein said step of measuring comprises the step of continuously sampling at least one of a current, a voltage, and a frequency.
- [c4] A method in accordance with Claim 1 wherein said step of measuring comprises the step of performing a self-test diagnostic when at least one of a power-up occurs, when an internal fault is detected and an auxiliary power is lost.
- [c5] A method in accordance with Claim 1 wherein said step of measuring comprises the step of determining a true root mean square value for at least one of a voltage and a current.
- [c6] A method in accordance with Claim 5 wherein said step of determining a root mean square value comprises the step of detecting failures in a generator.
- [c7] A method in accordance with Claim 6 wherein said step of detecting failures comprises the step of recording a date and time of failure.
- [c8] A method in accordance with Claim 7 wherein said step of detecting failures comprises the step of storing in memory a failure, when a failure occurs.
- [c9] A method in accordance with Claim 1 wherein said step of determining a power value comprises the step of opening a circuit breaker when at least

one of an internal fault is detected and auxiliary power is lost.

[c10] A metering system comprising a plurality of electrical relays, a display, a microprocessor, a memory, and a plurality of printed circuit boards configured to accept voltage and current to be measured, said microprocessor electrically connected to the memory, the printed circuit boards, and the display, said printed circuit boards electrically connected to a device, said system configured to continuously monitor voltage, current and frequency to protect the device.

[c11] A system in accordance with Claim 10 wherein said system further comprises a watchdog relay connected to the device to be protected.

[c12] A system in accordance with Claim 11 wherein said watchdog relay configured to perform self-diagnostic checks at power-up.

[c13] A system in accordance with Claim 11 wherein said watchdog relay configured to be connected to a breaker trip circuit, said breaker trip circuit configured to open a breaker when at least one of an internal fault is detected and auxiliary power is lost.

[c14] A system in accordance with Claim 10 wherein said system further comprises an auxiliary power supply connected to a device.

[c15] A system in accordance with Claim 14 wherein said auxiliary power supply configured to operate as a switched mode auxiliary power supply.

[c16] A system in accordance with Claim 10 wherein said relays comprise change over relay contacts, said change over contacts include one normally open contact and one normally closed contact.

[c17] A system in accordance with Claim 10 wherein said system configured to control at least one relay based upon measurements of at least one of a synchronization, synchronization with dead-bus, directional power, phase balance, AC time over, AC time over with voltage restraint, under voltage, phase sequence, neutral ground fault, over voltage, over frequency, and

under frequency connected to a device to be monitored and protected.

[c18] A system in accordance with Claim 10 wherein said system configured with an event log, said event log recording a date stamp, a time stamp, a relay number, a function assigned to a relay, and a present parameter when a relay is tripped.

[c19] A system in accordance with Claim 10 wherein said system further comprises an RS-485 communications port.

[c20] A system in accordance with Claim 19 wherein said RS-485 communications port configured as an electrically isolated 2-wire plus ground electrical interface.

[c21] A system in accordance with Claim 10 wherein said display configured to display a status of at least one of a current, a voltage and a frequency for a plurality of relays.

[c22] A system in accordance with Claim 10 wherein said system further comprises current transformer inputs.

[c23] A system in accordance with Claim 22 wherein said current transformer input configured to be electrically isolated from ground and from other current transformers.

[c24] A system in accordance with Claim 15 wherein said auxiliary power supply is operable within a voltage range of 8Vdc to 36Vdc.

[c25] A system in accordance with Claim 10 further comprising a multi-level security system configured to allow different levels of access to said metering system through input of a password.